
QSFP28-LR4

100Gb/s 1310nm QSFP28 Transceiver

Features

- Supports 103.1Gb/s, each lane bit rate 25.78 Gb/s
- Up to 10km transmission on SMF
- LAN WDM DFB laser and PIN receiver
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with duplex LC connector
- Single +3.3V power supply
- Maximum power consumption 4 W
- Operating case temperature: 0 to +70 °C
- Complies with EU Directive 2011/65/EU (RoHS 6/6)

Application

- 100GBASE-LR4 100G Ethernet

QSFP28-LR4 QSFP28 transceiver module is designed for use in 100 Gigabit Ethernet links on up to 10km of single mode fiber. It is compliant with the QSFP28 MSA, IEEE 802.3ba 100GBASE-LR4 and IEEE 802.3bm CAUI-4. Digital diagnostics function is available via the I2C interface, as specified by the QSFP+ MSA.

Order Information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
QSFP28-LR4	103.1Gbps	LAN WDM DFB	SMF	10km	LC	0~70°C	Y

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T _s	-40	-	+85	°C	
Supply Voltage	V _{cc}	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T _c	0	-	+70	°C	
Power Supply Voltage	V _{cc}	3.13	3.3	3.47	V	
Power Supply Current	I _{cc}	-	-	1.15	A	

Maximum Power Dissipation	P_D	-	-	4	W	
Aggregate Bit Rate	BR_{AVE}	-	103.125	-	Gb/s	
Lane Bit Rate	BR_{LANE}	-	25.78	-	Gb/s	
Transmission Distance	TD		-	10	km	Over SMF

Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Total Launch Power	P_{ALL}	-	-	10.5	dBm	1
Average Launch Power per Lane	P_{TX_LANE}	-4.3	-	4.5	dBm	1
Transmit OMA per Lane	$TxOMA$	-1.3	-	4.5	dBm	1
Difference in launch power between lanes	$P_{TX_DELTA_LANE}$	-	-	5	dB	
Average Output Power (Laser Turn off)	$P_{OUT-OFF}$	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	4	-	-	dB	
Transmitter and Dispersion Penalty	TDP	-	-	2.2	dB	2
Optical Return Loss Tolerance	ORLT	-	-	20	dB	
Optical Eye Mask	Compliant with IEEE 802.3ba					2
Receiver						
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Average Rx Power per Lane	P_{RX_LANE}	-10.6		4.5	dBm	2
OMA Sensitivity per Lane	Sen_{OMA}	-	-	-8.6	dBm	2
Receiver Overload	P_{IN-OL}	4.5	-	-	dBm	
Reflectance	Ref	-	-	-26	dB	
LOS Assert per lane	LOS_A	-25	-	-	dBm	
LOS De-assert	LOS_D	-	-	-11.6	dBm	
LOS Hysteresis	LOS_H	0.5	-	4.0	dB	

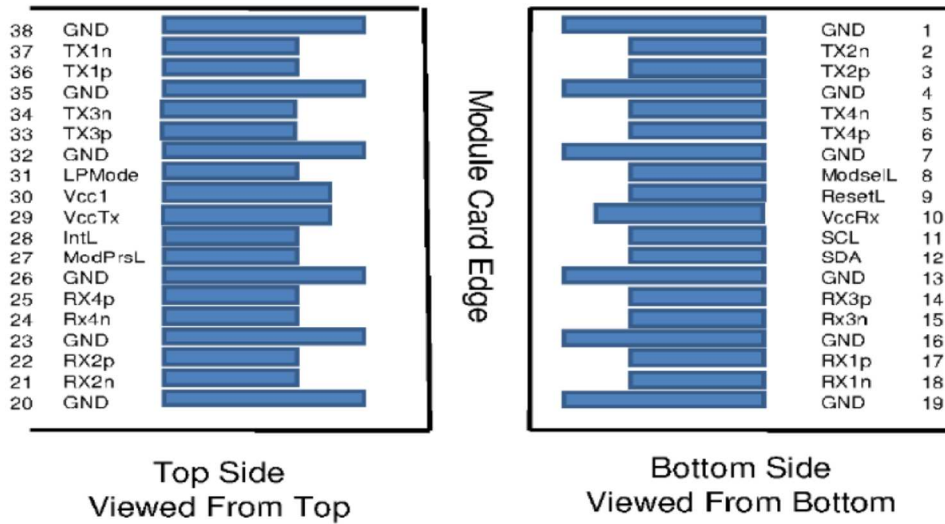
Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS $2^{31}-1$ test pattern @25.78125 Gb/s.

Electrical Characteristics

Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Differential Data Input Amplitude	$V_{IN,P-P}$	100	-	1100	mVpp	
Input Impedance (Differential)	Z_{IN}	85	100	115	Ohms	
Differential Termination Mismatch		-	-	10	%	
Receiver (Module Output)						
Differential Data Output Amplitude	$V_{OUT,P-P}$	200	-	900	mVpp	
Output Impedance (Differential)	Z_{OUT}	85	100	115	Ohms	
Differential Termination Mismatch		-	-	10	%	
Output Rise/Fall Time, 20%~80%	T_R/T_F	12	-	-	ps	

Pin Description



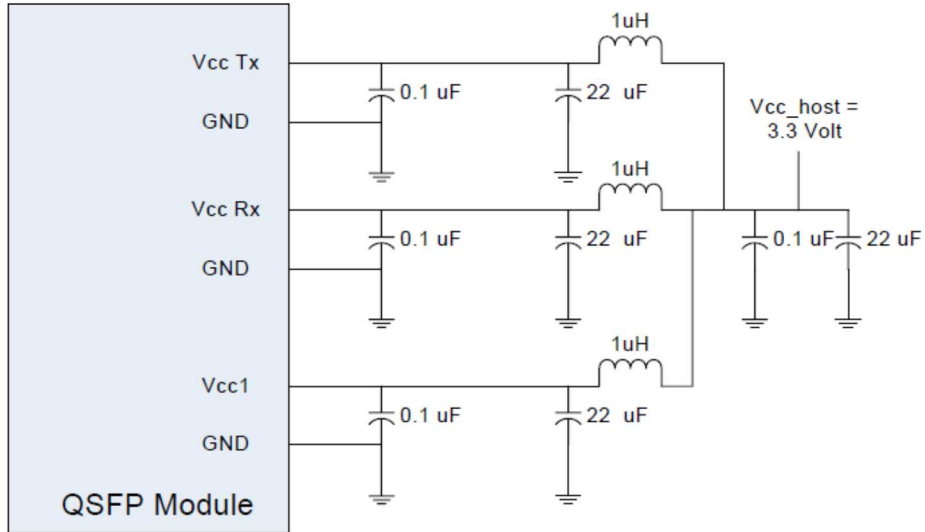
Pin	Name	Logic	Function	Plug Seq.	Notes
1	GND		Ground	1	1
2	Tx2n	CML-I	Transmitter Inverted Data Input	3	
3	Tx2p	CML-I	Transmitter Non-Inverted Data	3	
4	GND		Ground	1	1
5	Tx4n	CML-I	Transmitter Inverted Data Input	3	
6	Tx4p	CML-I	Transmitter Non-Inverted Data	3	
7	GND		Ground	1	1
8	ModSelL	LVTTL-I	Module Select	3	
9	ResetL	LVTTL-I	Module Reset	3	
10	VccRx		+3.3V Power Supply Receiver	2	2
11	SCL	LVC MOS-I/O	2-wire serial interface clock	3	
12	SDA	LVC MOS-I/O	2-wire serial interface data	3	

13	GND		Ground	1	
14	Rx3p	CML-O	Receiver Non-Inverted Data Output	3	
15	Rx3n	CML-O	Receiver Inverted Data Output	3	
16	GND		Ground	1	1
17	Rx1p	CML-O	Receiver Non-Inverted Data Output	3	
18	Rx1n	CML-O	Receiver Inverted Data Output	3	
19	GND		Ground	1	1
20	GND		Ground	1	1
21	Rx2n	CML-O	Receiver Inverted Data Output	3	
22	Rx2p	CML-O	Receiver Non-Inverted Data Output	3	
23	GND		Ground	1	1
24	Rx4n	CML-O	Receiver Inverted Data Output	3	
25	Rx4p	CML-O	Receiver Non-Inverted Data Output	3	
26	GND		Ground	1	1
27	ModPrsL	LVTTL-O	Module Present	3	
28	IntL	LVTTL-O	Interrupt	3	
29	VccTx		+3.3V Power supply transmitter	2	2
30	Vcc1		+3.3V Power supply	2	2
31	LPMODE	LVTTL-I	Low Power Mode	3	
32	GND		Ground	1	1
33	Tx3p	CML-I	Transmitter Non-Inverted Data	3	
34	Tx3n	CML-I	Transmitter Inverted Data Input	3	
35	GND		Ground	1	1
36	Tx1p	CML-I	Transmitter Non-Inverted Data	3	
37	Tx1n	CML-I	Transmitter Inverted Data Input	3	
38	GND		Ground	1	1

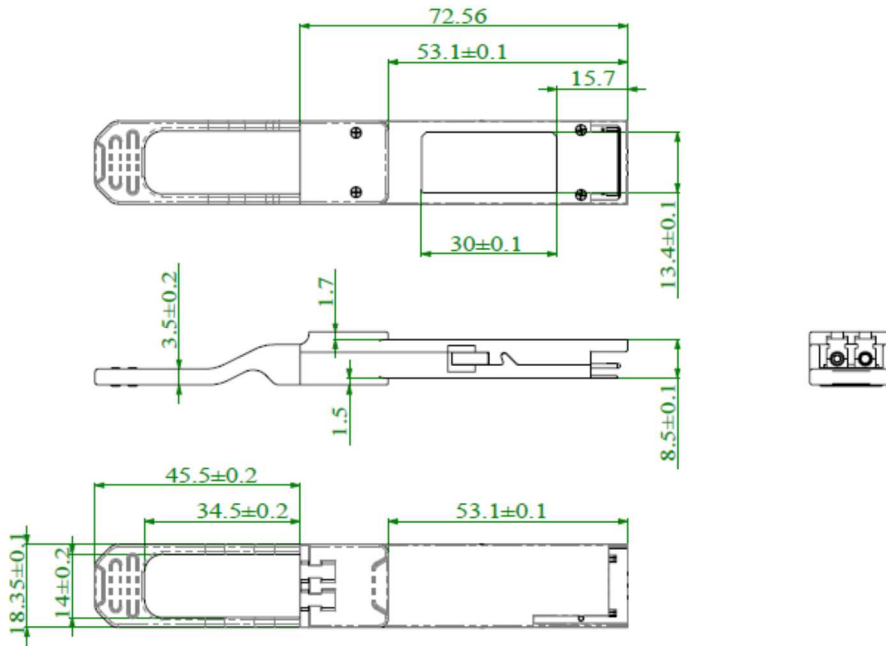
Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connected there directly to the host board signal-common ground plane.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in QSFP MSA. VccRx, Vcc1 and VccTx may be internally connected within the QSFP28 in any combination. The connector pins are each rated for a maximum current of 500mA.

Recommended Host Board Power Supply Circuit



Mechanical Dimension



Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to V _{CC}	0.1	V	Internal
Tx Bias Current Per Lane	0 to 100	10%	mA	Internal
Tx Output Power Per Lane	to 2.9	±3	dBm	Internal
Rx Power (Each Lane)	-21 to 5	±3	dBm	Internal

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.